

GRUNDIG

SERVICE MANUAL

**Radio
Recorder****C 4100
C 4500**

For Service Manuals Contact
MAURITRON TECHNICAL SERVICES
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Mechanical Section

General

Mechanically and electrically the units are similar the only difference being in the cabinet design. They are all equipped with coverage of the Long, Medium and Short wave bands.

The figure in the text and illustrations are identical with the position (item) numbers of the parts list. Parts not included in the parts list are indicated by letters.

If screws secured by varnish have to be loosened, these must be revarnished afterwards.

Clean rubber surfaces are essential for operational efficiency. Cleaning of these items must be carried out with Cleaning Petrol (oil free). Many trim items are glued to the cabinet. Polystyrene items can be glued with solvents (methylene-chloride or benzole).

For other plastics, metal to plastic or metal to metal a suitable adhesive (e.g. titebond) must be used. Special tools can be obtained from Grundig (G.B.) Ltd., and spring balances from W.C. Carr Ltd., 7-15, Roseberry Ave., London E.C.1.

Magnetic tools must not be brought close to the heads.

Demagnetize screw drivers before use.

Test network circuits (MS ..) can be found in the electrical section.

Experience has shown that compact cassettes generally available on the market can vary greatly in quality. In several cases of complaints the cassette can be the sole cause of failure. Therefore, before taking the unit apart, two points should be carefully checked.

1. Cassettes, whose tape material has no or only limited resistance to abrasion will deposit oxide in the sound channel. Consequently, depending upon the degree of deposit on the recording-playback head, only low muffled recording will be possible. Pre-recorded cassettes will not play back or only at a low muffled level. In this case it is sufficient to clean heads, pressure roller, capstan spindle and tape guides using a linen cloth dampened in petrol or methylated spirits in order to eliminate the trouble.
2. Cassettes, whose rollers do not look clean or whose tapes are difficult to pull out (compare with factory-new cassettes) can cause whining on playback and come to a standstill when rewinding. In many cases the tape is wavy at the edge, curls up or appears deformed when placed on a flat surface. When the tape is deformed the pressure roller may become jammed. Owing to the increased friction the tape is more statically loaded at the take up spool which again increases the roller friction.

Cassettes displaying these faults must not be used again

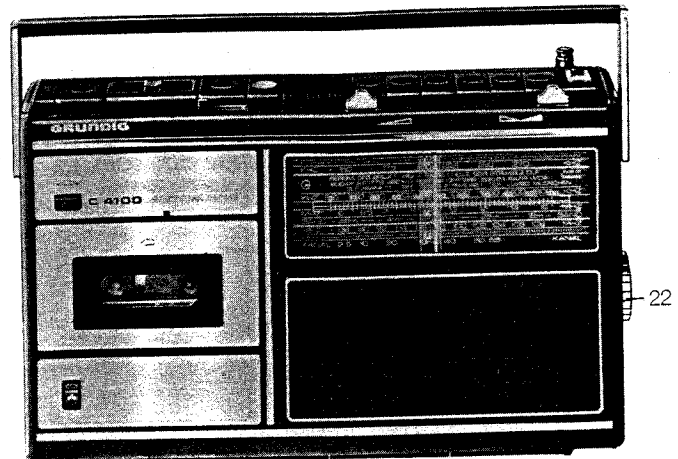


FIG.1a C4100

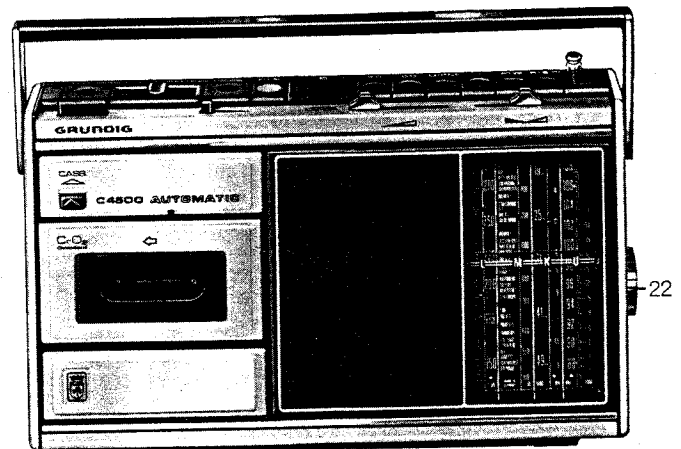


FIG.1b C4500

15035

Hints for Dismantling

Taking off back panel (24)

Open battery compartment, remove 3 screws (a) pull off control knob (22) open back of casing (24) and remove. All connections between the individual component groups (tape recorder unit, radio unit, power supply and loudspeaker) can be unplugged.

Changing the fuse : possible only when back of the case is removed.

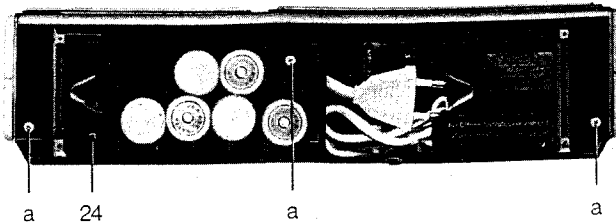


FIG. 2 REMOVING BACK PANEL.

Removing the drive mechanism

Remove plug (45), remove cable holder (123) and remove 3 screws (b). Take out mechanism, removing cassette beforehand. After refitting the drive mechanism the microphone connecting cable must be inserted into the cable duct, under the printed board (126), to the connecting socket. Refit cable holder.

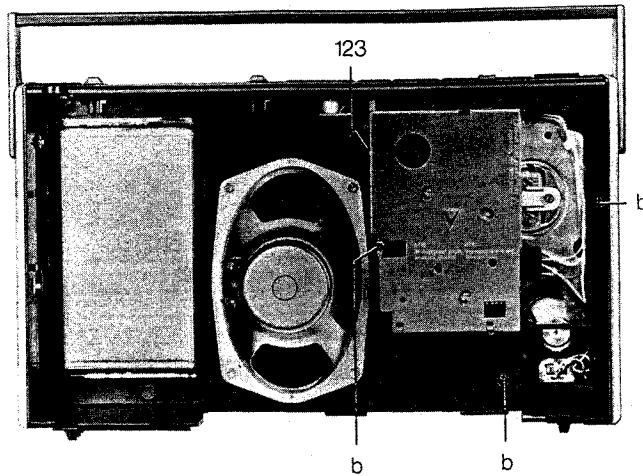


FIG. 3 REMOVING DRIVE MECHANISM.

To remove radio unit

Push notch at point (c), lift radio unit and take out at opposite side. Release plug and lift (30) from bracket. When refitting check that cables - as shown in the illustration - are correctly fitted.

To remove scale with drive cord

Set pointer (42) to marked point, pull off pulley (39) release snaps (0) of scale, (one for C4100 two for C4500), lift scale (36) slightly and release from tuning condenser (Drehko) spindle.

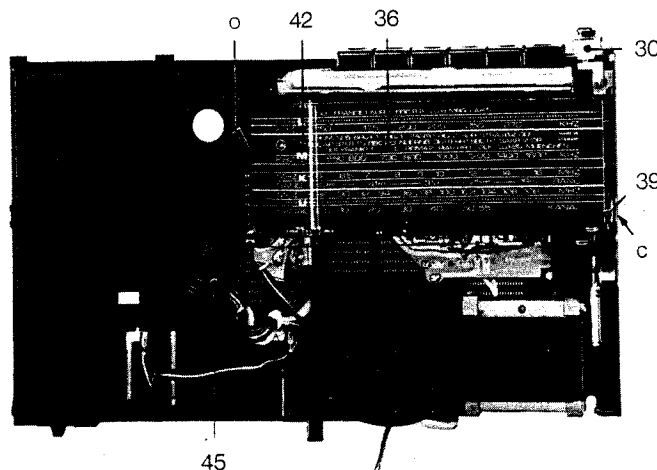


FIG. 4 TO REMOVE RADIO UNIT/SCALE.

To expose solder tag of recorder printed board
Using screw driver release screening plate at point (e) and lift off.

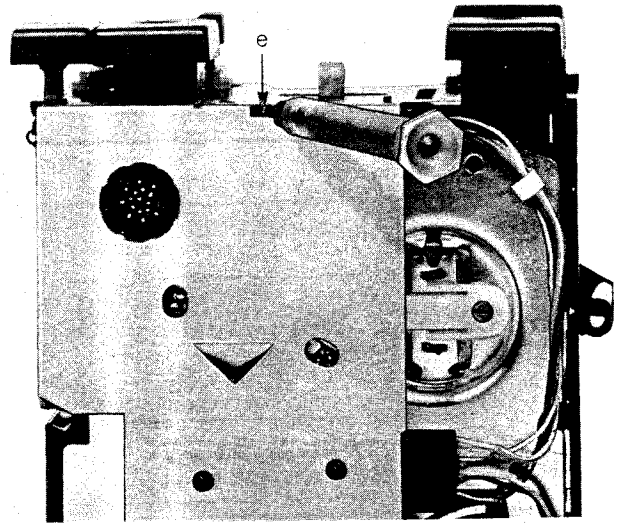


FIG. 5 TO EXPOSE RECORDER PRINTED BOARD.

To remove recorder printed board

Lightly bend away 2 lugs (f) and remove printed board (126). Remove plug (124) if necessary. When refitting ensure contact slider (slider switch 131,132,133) is in correct position.

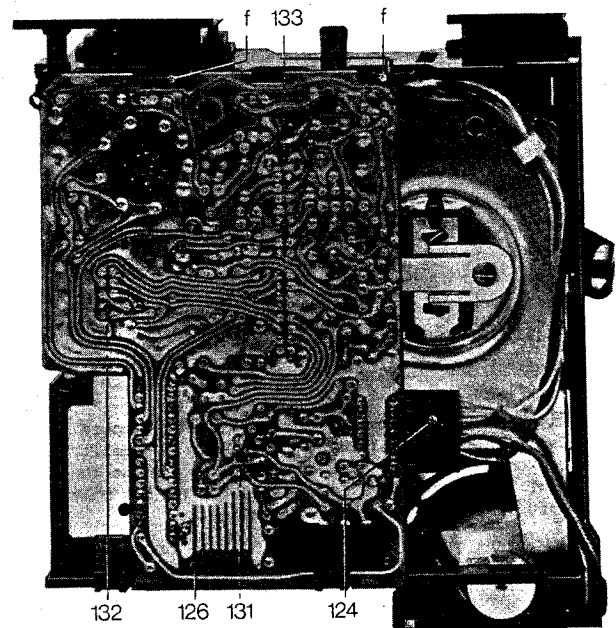


FIG. 6 TO REMOVE REC. PRINTED BOARD.

Motor replacement

To change the motor unsolder connections and unhook belt (73). Press down tension spring (52) at the point shown and turn in the direction of arrow. Pull out motor unit (51) and exchange completely. After installing new motor unit (51) check tape speed and adjust, if necessary, with R5. Do not bend earthing spring (60).

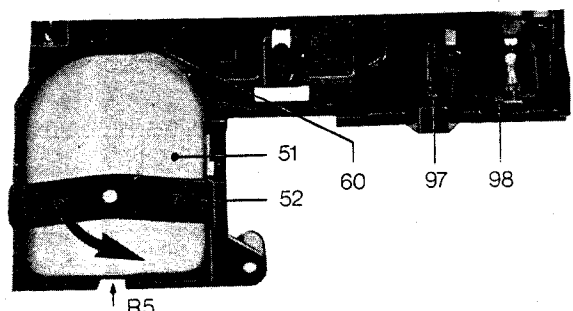


FIG. 7 MOTOR CHANGE.

Belt change

To change the belt (69) or (73) remove screw (i) and take off bearing plate. Unhook springs (85) and (98). Do not damage feeler lever (97). See fig. 7. After refitting, check axial play of capstan. See para. (flywheel (70)).

Spring set S1

Spring set S1 consists of contacts (78) and (79). On start and with recording button depressed or fast forward selected, contact (79) must lift up 0.1mm from the supporting lug.

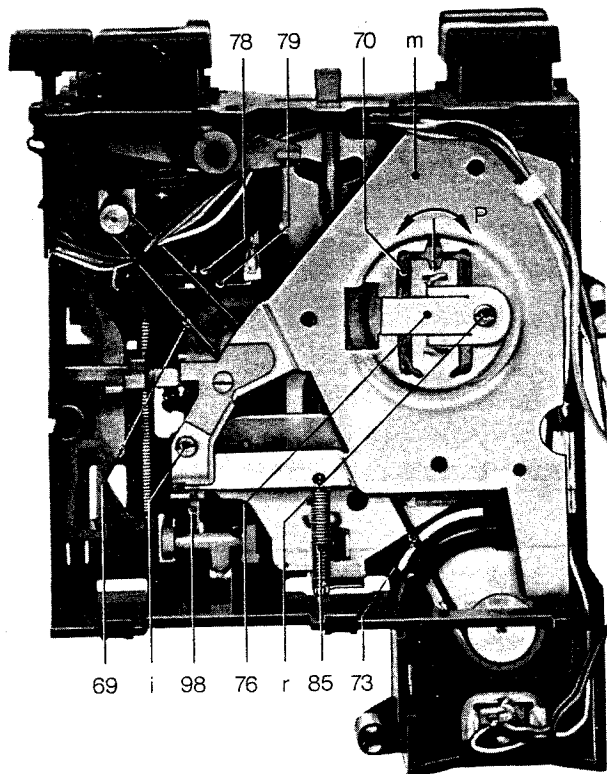


FIG. 8 BELT CHANGE/S1/FLYWHEEL

To adjust tape speed

For this the 50Hz recording of the test tape cassette 466 is used. An oscilloscope and a variable isolating transformer are required. Connect AF output (pins 3/2 of universal socket) to the input of the oscilloscope (Y deflection) (MS2). Switch X deflection to external deflection and feed in a variable voltage of 50Hz (variable isolating transformer) to the X input. The deflection should be approximately half the screen diameter. Play 50Hz recording of test tape cassette. Using R5 bring the displayed circle to a standstill (lissajous figure). See fig. 7. The 3150Hz recording serves to adjust the speed with tone pitch oscillator (e.g. Woelke ME 101, or EMT 420 manufactured by Franz KG.Lahr) or Grundig Universal Meter UZ 144.

Flywheel (70) (see fig. 8/9)

The correct adjustment of the flywheel with sound shaft is checked with the use of tape cassette 35079-103. In position START, the tape must not run out between sound shaft and pressure roller, nor fold over at the top or bottom edge of the tape guide forks. Readjust by bending at bending point (p) of bearing plate (m), using screw driver size 5 while watching the tape movement, looking at unit from the top. If the tape runs upwards = turn anticlockwise. If the tape runs downwards = turn clockwise. Following this adjustment or belt change, the axial play of the flywheel (70) has to be checked especially if the machine has had a lot of use. For this a milliamperes-meter is fitted to the motor circuit. Before carrying out the adjustment, the flywheel (70) must have distinct axial play. First tighten screw (r) on pressure piece (76) until the motor current increases by 15mA. Loosen it again until the current reaches minimum. Subsequently the

screw is adjusted until the current increases by 2mA. Finally loosen screw $\frac{1}{2}$ turn and secure with varnish.

Head Change

For soldering the head connections a soldering iron of 6W max. must be used. Unsolder erase head (102) and push from bracket in direction of arrow. Push in new head up to stop. Unsolder Record/Playback head (107), remove screw (h), loosen screw (n), swivel head and take out.

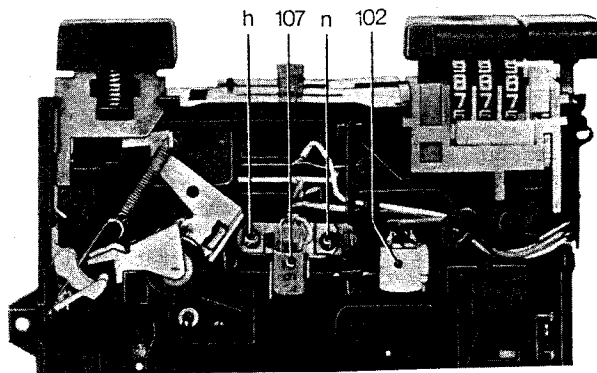


FIG. 9 HEAD CHANGE.

Head Adjustment

After replacing Record/Playback head (107) the position and height must be adjusted using gauge 3400-029.00. Loosen screw (A) and fit gauge. Switch unit to START, push slider (B) to centre and press head carrier in the direction of the gauge until the head (107) rests against the gauge. Tighten screw (A) in this position. Turn screw (h) until the feeler lever (C) can just be guided between the tape guide fork. Visually the head must then be vertical. Before removing gauge, switch unit to STOP. Put on test cassette 466, wind tape to part 2 (6.3kHz) recording. Switch unit to PLAYBACK/START. The output voltage is measured with MS2. Adjust to max. output level by turning screw (n). If the head is adjusted whilst the chassis is out of the cabinet, the output voltage must be checked on refitting. When the chassis is left in the cabinet the screw (n) can be reached with a small screw driver through the hole above the cassette compartment. Subsequently adjust bias according to colour code as described in the electrical section.

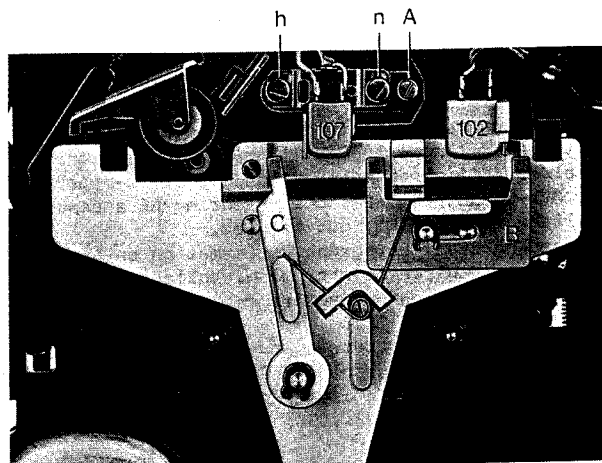


FIG. 10 HEAD ADJUSTMENT-GAUGE 34000-029.00

Maintenance

The heads (102/107), the pressure roller (u), the capstan spindle and the drive wheel (80), mounted on the hinged lever, must be cleaned with cleaning petrol or methylated spirits at regular intervals of 100...200 working hours or after every repair to the mechanics.

Pressure roller (u)

The pressure roller (u) is self-adjusting. In position START the pressure must be 300 ± 50 grams (measured towards the capstan). If the pressure roller is damaged the pressure roller lever (111) complete must be changed.

Clutches (91) and (92)

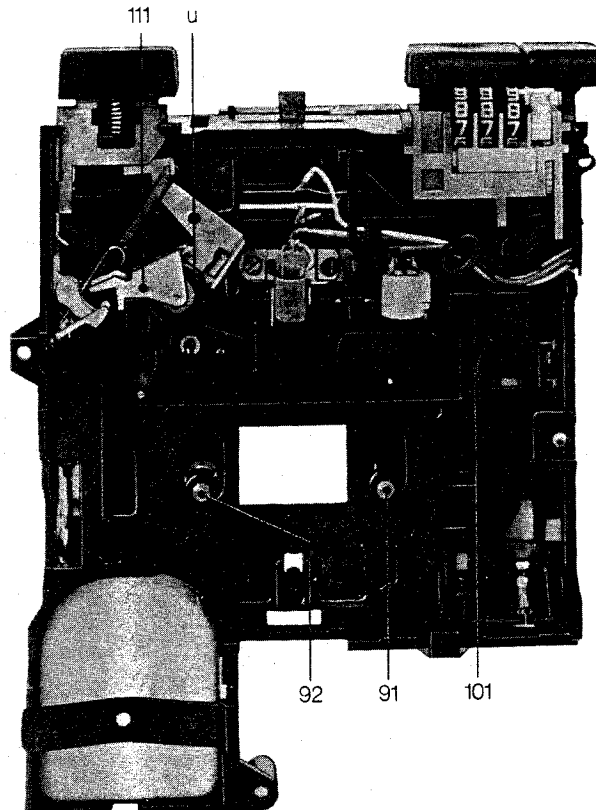
To measure basic braking and torques, pulley 5100-347 must be used. Using radius of 1cm the forces can be read in grams.

The winding moment of clutch (92), while lower half is driven, and contactor held, is 33 ± 5 grams. To increase the winding moment, the carrier (92.5) can be removed and a second washer (92.3) fitted. The basic braking of the clutch (91) in position START must be 2...4grams.

Adjustment:- bend the braking spring (101)

Oiling and lubricating

All bearings and slider points are oiled or lubricated during production. When necessary the axles and the slider operating against sinter bearings or plastic, must be lightly oiled with WIK 700. Sliding surfaces should be regreased with Beacon 2.



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Electrical Section

Tape recorder unit

The test values given in the following have been taken from the production test schedule and apply to chromedioxide cassettes.

After replacing heads, transistors or other components which influence the frequency response, a test on tape will show whether the unit still operates to specification.

When testing without tape, to press the recording button the recording lock (88) must first be operated. The feeler lever (97) must not be operated because all test values are based on chromedioxide tape. A chromedioxide dummy cassette can also be used. Test values for Fe tapes are given in brackets.

All the required test equipment is included in the Grundig range of test equipment. For measuring distortion factors K_3 and K_{tot} and noise and external voltages to DIN standards, the distortion analyser KMS which matches the millivolt-meter MV5 or MV5-0 must be used. For measuring RF a capacitive voltage divider CK5 must be used.

Preceding every paragraph, information on test methods and circuits are given. Voltages are given before the divider or series resistor. Test circuits are shown on page 10.

Letters in ▼ indicate test points in the circuit diagram or on the printed board illustration. For service work the use of the built-in mains unit at $220V \pm 2\%$ 50...60Hz is recommended, unless otherwise indicated.

Current Consumption for battery operation

(Battery button depressed, 9V at battery terminals)

Position Playback: START without signal, shortly before end of tape 80mA.

Position Recording: START without signal, shortly before end of tape 180mA.

Position FM: volume control min 35mA.

Recording bias,

(Adjustment necessary after head change)

Switch unit to RECORDING/START. Test with capacitive voltage divider CK5 (MS1). Depending on colour code of head the following voltage must be obtained.

Colour code: red 37 V (16.5 ± 0.5 V) Adjust
blue 43 V (19.0 ± 0.5 V) with
yellow 49 V (21.5 ± 0.5 V) R 131

The bias frequency measured with GRUNDIG absorption Frequency meter FM 1 or resonance meter TR 30 must be 70.5 ± 2.5 kHz. When the oscillator switch is closed, the frequency should drop by approx 9.5 kHz. Adjust by connecting in parallel or unsoldering capacitors C122 and C123 to C117.

Coils L101 and L102 have been aligned during manufacture and must not be adjusted. Only aligned coils are supplied as spare parts. Coil L101 is adjusted to $1.05 \text{ mH} \pm 3\%$ (Measured at connections 2 and 1), coil L102 to $15 \text{ mH} \pm 3\%$

Test tape playback:

To check the playback amplifier, it is sufficient in most cases to play test cassette 466. Switch unit to playback/START.

The output voltage is measured with MS 2.

The output voltage of the 333 Hz section (part 3) must be at least 520 mV.

The playback voltages of the 125 Hz and 6.3 kHz may deviate from the 1kHz reference as follows:

1 kHz (reference voltage)	0dB
125 Hz	$1 \pm 3\text{dB}$
6.3 kHz	$0 \pm 5\text{dB}$

If the reading for 6.3 kHz is below 20 mV and readjustment of the head does not make correction possible, the head must then be changed.

Test Via Tape:

For this use a chrome dioxide cassette C60 (reference C401R or equivalent). In order to obtain definite playback readings, the frequency response capacitor C107 (47 μ) (points $\blacktriangledown$ and $\blacktriangledown$) is short-circuited during the recording. The short circuit does not apply to the full-level testing. Switch unit to recording/START or playback/START respectively. Feeding in for recording via MS 3. Measure output voltage for playback with MS 2.

Sensitivity and full level

For full level recording the input voltage at 333 Hz is adjusted to 180 mV and recorded. The playback voltage must be between 635 and 1270 mV. The distortion factor k_3 must lie between 2% and 4%. If these values are exceeded or fall short then the head current must be changed by adjusting R130 and testing repeated. Make a note of test readings.

Frequency response

For measuring the frequency response the input voltage is set to 18 mV and kept constant for all frequencies.

The playback voltages of these readings with reference to the output voltage for 333 Hz $\triangleq$ 0 dB may vary as follows:-

63 Hz	-3 $\pm$ 5 dB
125 Hz	0 $\pm$ 2 dB
4 kHz	0 $\pm$ 3 dB
8 kHz	0 $\pm$ 5 dB (0 $\pm$ 6 dB)

If the output voltages of the upper frequencies lie outside the tolerances, the bias voltage must be checked.

Interference voltage on tape

For this erase the 333 Hz full-level recording. The signal/noise ratio of the playback voltage at full-level 333 Hz (see above) and the erased section of the 333 Hz full-level recording with a short-circuited input must be:

$\geq$ 45 dB (weighted)
$\geq$ 48 dB (unweighted)

(measured according to DIN with KM 5/peak value)

The following tests are necessary only if tests on tape do not produce a satisfactory result.

Checking the automatic circuit

Switch unit to RECORD/START. Mute HF-generator by a short circuit between the base/emitter of transistor T106 $\blacktriangledown$ - $\blacktriangledown$. Input via MS 3 test via MS 4.

Sensitivity

With an input voltage of 175 mV @ 1 kHz it must produce 1100 ... 1400 mV at test point $\blacktriangledown$ (make note of reading).

Control Range

If the input voltage at 1 kHz is increased by 20 dB to 1750 μ V, the output voltage may rise 2 dB max. over the value found above.

Rise time

Hold for 30 seconds an input voltage of 550 mV at 1 kHz and then decrease by 20 dB. The time in which the output voltage takes to rise by 6 dB after the sudden drop must take at least 10 seconds.

Recording Amplifier

Switch unit to RECORD/START. Take automatic and HF-generator out of operation by short-circuiting test points $\blacktriangledown$ and $\blacktriangledown$ or $\blacktriangledown$ and $\blacktriangledown$. Feed input via MS 3. Measure output voltage with MS 4 at point $\blacktriangledown$.

Sensitivity

For 333 Hz an output voltage of 1250 mV must be obtained at test point $\blacktriangledown$. The input voltage for this may be 17.5 mV $\pm$ 1 dB. (15.6 ... 19.7 mV).

Frequency Response

To measure the frequency response the input voltage is set to approx. 1.7 mV and kept constant and only the frequency changed. With reference to 333 Hz the other frequencies may vary as follows:

333 Hz	Ua = 0 dB
63 Hz	+ 0.5 ... + 2.5 dB
125 Hz	0 ... + 1 dB
1 kHz	0 ... + 1 dB
4 kHz	+ 5.5 ... + 7.5 dB
8 kHz	+11.5 ... +14.5 dB
10 kHz	+14.5 ... +17.5 dB
12.5 kHz	+17.5 ... +20.5 dB

Interference Voltages

Input via MS 8. Measure interference voltage with MS 4 and MV 5 + KM 5 (Peak value).

The external voltage must not exceed 100 mV. The noise voltage must not exceed 60 mV. (with HF not muted $\leq$ 200 mV_{eff})

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Playback Amplifier

Switch unit to PLAYBACK/START. Feed input via MS 5. Measure output with MS 2.

Sensitivity

An input voltage of 18 mV at 333 Hz must produce 245 mV $\pm$ 1 dB at the output.

Frequency Response

To measure the frequency response the input voltage 18 mV is kept constant and only the frequency changed. With reference to 333 Hz the other frequencies may vary as follows:

333 Hz	Ua = 0 dB
63 Hz	+ 7 ... + 9 dB
125 Hz	+ 6 ... + 7 dB
1 kHz	-8.5 ... -7.5 dB
4 kHz	- 12 ... - 10 dB
8 kHz	- 9 ... - 6 dB
10 kHz	-6.5 ... -3.5 dB
12.5 kHz	- 4 ... - 1 dB

Interference Voltages

Amplifier input loaded with playback head. Test while the motor is running.

External voltage	3.2 mV peak value
Noise voltage	2.0 mV peak value

Radio Unit

To be able to reach several of the alignment points, the scale (36) must be removed. Possibly the radio unit must also be removed (see page 2).

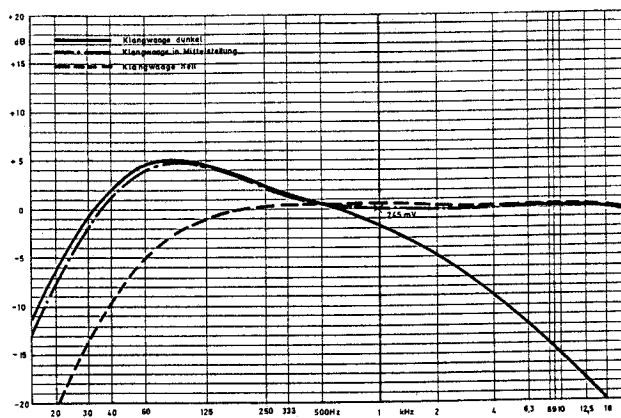
Power Output Stage

Power Output Stage Quiescent Current

The output stage quiescent current, for battery operation ($U_b = 9V$) is measured at the soldered bridge X (collector T012 via MS 7) must be 7.5 mA. Adjust with R 644.

Power Output/Frequency Response

Feed AF-voltage via MS 9. Measure the output voltage with MS 6 across the load resistance of 4.5Ω connected to the LS- connecting plug. The AF-input voltage is adjusted so that the power output at the 4.5Ω load resistance for $k_{tot} = 10\% = 2W$ (battery and mains). This is equivalent to a voltage of 3V at the loudspeaker load resistance. The frequency response of the AF-unit is measured on mains. The input voltage is selected so that, with the volume control pushed fully open and the sound balance in the centre position, an output voltage of 2.45 V - 0 dB with $f = 1 kHz$ is obtained at the LS - load resistance. Then the volume control is reduced until an output voltage of 245 mV - (-20 dB) is measured. The input voltage is kept constant for all frequencies and control positions. All output voltages, test frequencies and positions of the tone control can be found in the frequency response graph.



FREQUENCY RESPONSE-TONE CONTROL.

External Voltage according to DIN 45405 in position TB-recording

With the volume control closed the external voltage, measured with MV 5/KM 5, may be max. 0.8 mV (peak value).

Adjustment of IF- Amplifier

With R 505 the voltage drop at emitter T 06 is set to 1.4 V.

Adjustment of the battery instrument

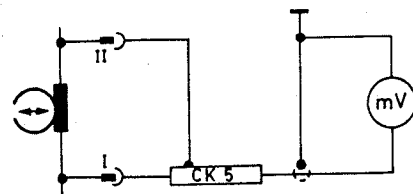
With control R 808 at $U_b = 6.0 V$ the trailing edge is set to the dividing mark of the battery scale.

Alignment instructions radio unit

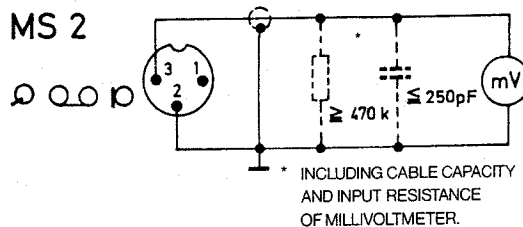
See page 14/15.

Test Circuits

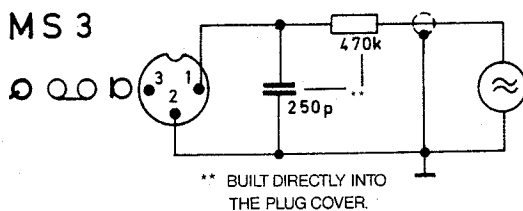
MS 1



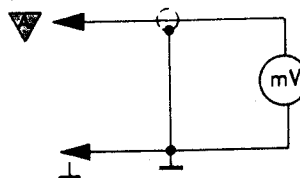
MS 2



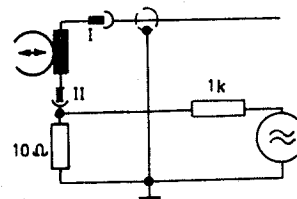
MS 3



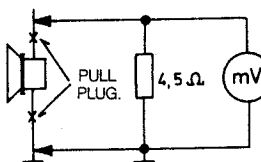
MS 4



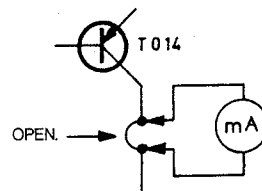
MS 5



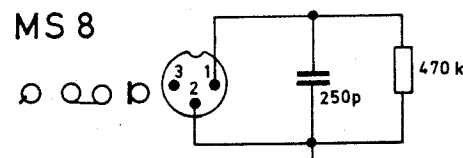
MS 6



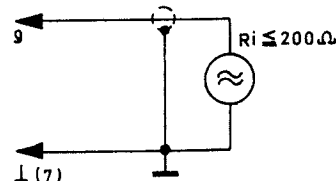
MS 7



MS 8



MS 9



NOTES.

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Decibel Factor Table

$$\left(\text{dB} = 20 \log \frac{U_1}{U_2} \right)$$

dB	0	1	2	3	4	5	6	7	8	9
0	1	1,122	1,259	1,412	1,585	1,78	2,00	2,24	2,512	2,82
10	3,162	3,55	3,981	4,47	5,012	5,62	6,310	7,08	7,943	8,91
20	10	11,22	12,59	14,12	15,85	17,8	20,0	22,4	25,12	28,2
30	31,62	35,5	39,81	44,7	50,12	56,2	63,1	70,8	79,43	89,1
40	100	112,2	125,9	141,2	158,5	178	200	224	251,2	282
50	316,2	355	398,1	447	501,2	562	631	708	794,3	891
60	1000	1122	1259	1412	1585	1780	2000	2240	2512	2820
70	3162	3550	3981	4470	5012	5620	6310	7080	7943	8910
80	10 000	11 220	12 590	14 120	15 850	17 800	20 000	22 400	25 120	28 200

Example 45dB = Factor 178

For working out values of currents and voltages using the decibel tolerance table the values can be used for obtaining the answer by multiplying (+dB) or by dividing (-dB).

$$55\text{mV} + 2\text{dB} = 55 \times 1.259 = 69.25\text{mV}$$

$$55\text{mV} - 2\text{dB} = 55 \div 1.259 = 43.7\text{mV}$$

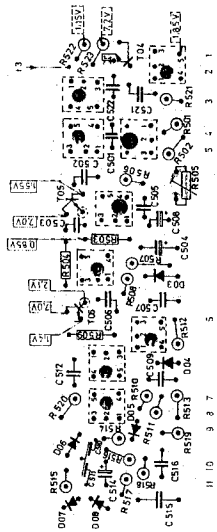
For Signal to Noise Ratio - e.g. 46dB below full level.

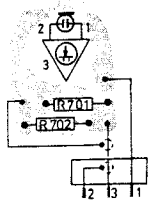
Make a note of the value - e.g. 940mV divide by the value indicated in the table.

$$46\text{dB below } 940\text{mV} = 940 \div 200 = 4.7\text{mV}$$

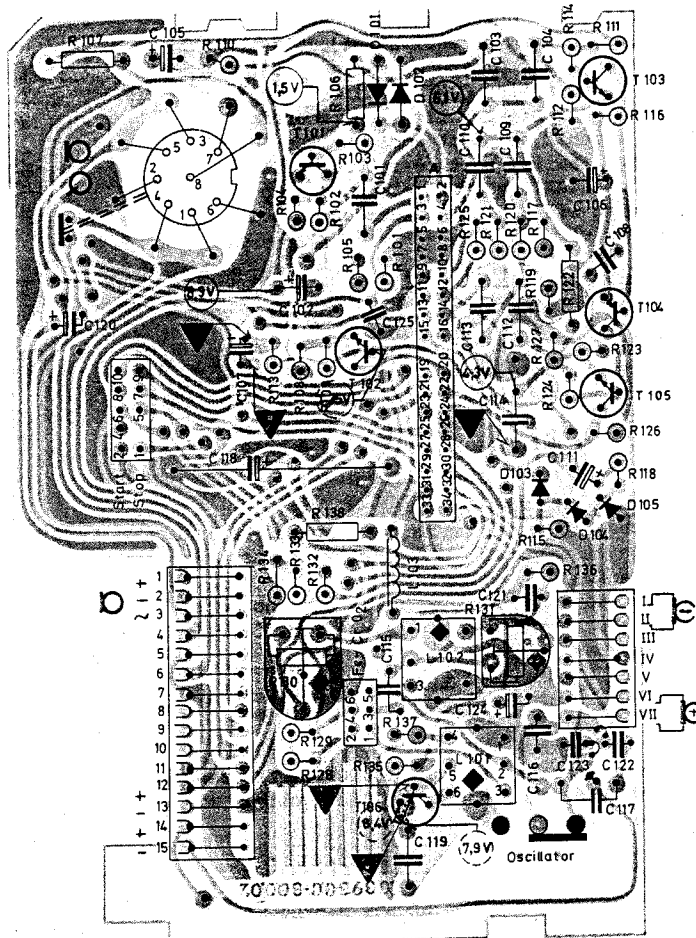
$$47\text{dB below } 940\text{mV} = 940 \div 224 = 4.2\text{mV}$$

IF-BOARD (SOLDER TAG VIEW)



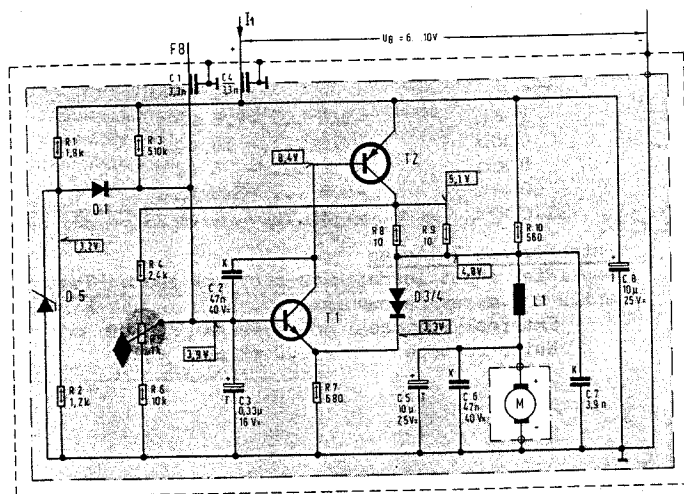


MICROPHONE BOARD (SOLDER TAG VIEW)

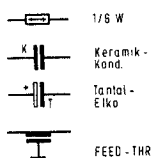


TAPE RECORDER UNIT (SOLDER TAG VIEW)

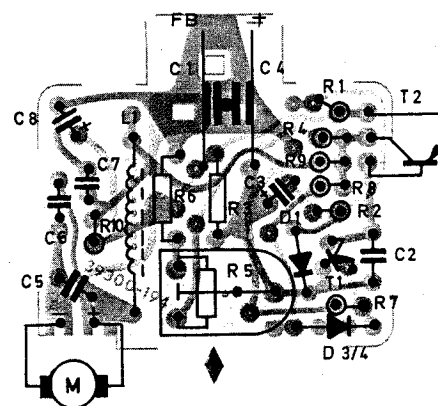
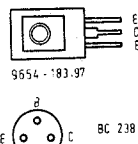
CIRCUIT DIAGRAM MOTOR UNIT (39730-906.03)



T 1	09230 - 189.01	
T 1	8C 238.8	
T 2	9654 - 103.97	Gr. 10 u.16
D 1	9654 - 211.97	
D 3	9654 - 351.04	
D 4	9654 - 351.04	} od. 1 x 82 102/1 V 4
D 5	9654 - 267.97	
C 1	} 00820 - 505.97	
C 4		

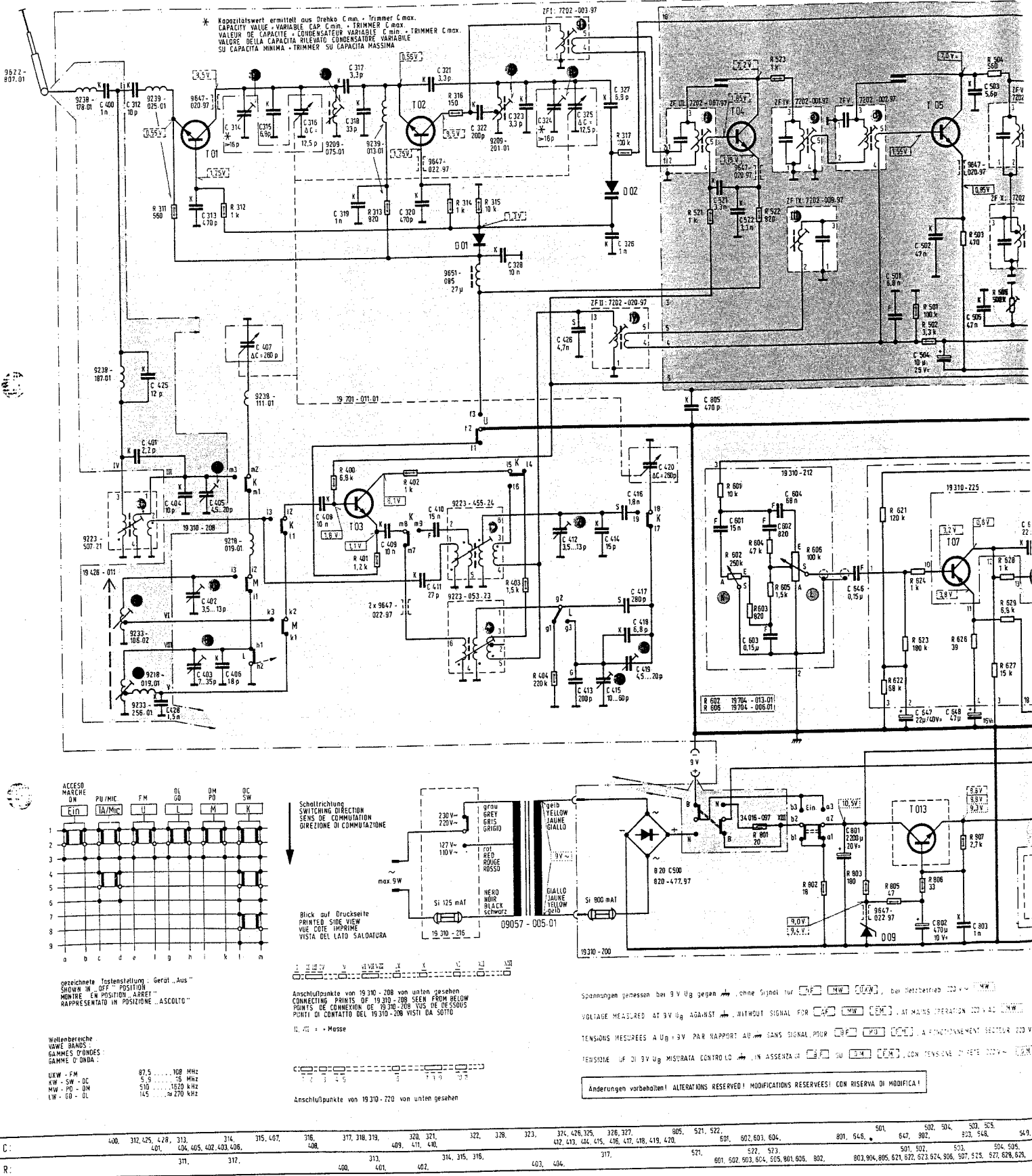


FEED - THROUGH - CAPACITOR



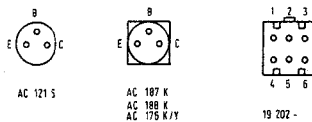
MOTOR UNIT (SOLDER TAG VIEW)

For Service Manuals Contact
MAURITRON TECHNICAL SERVICES
8 Cherry Tree Rd, Chinnor
Oxon OX9 4QY
Tel: 01844-351694 Fax: 01844-352654
Email: enquiries@mauritron.co.uk

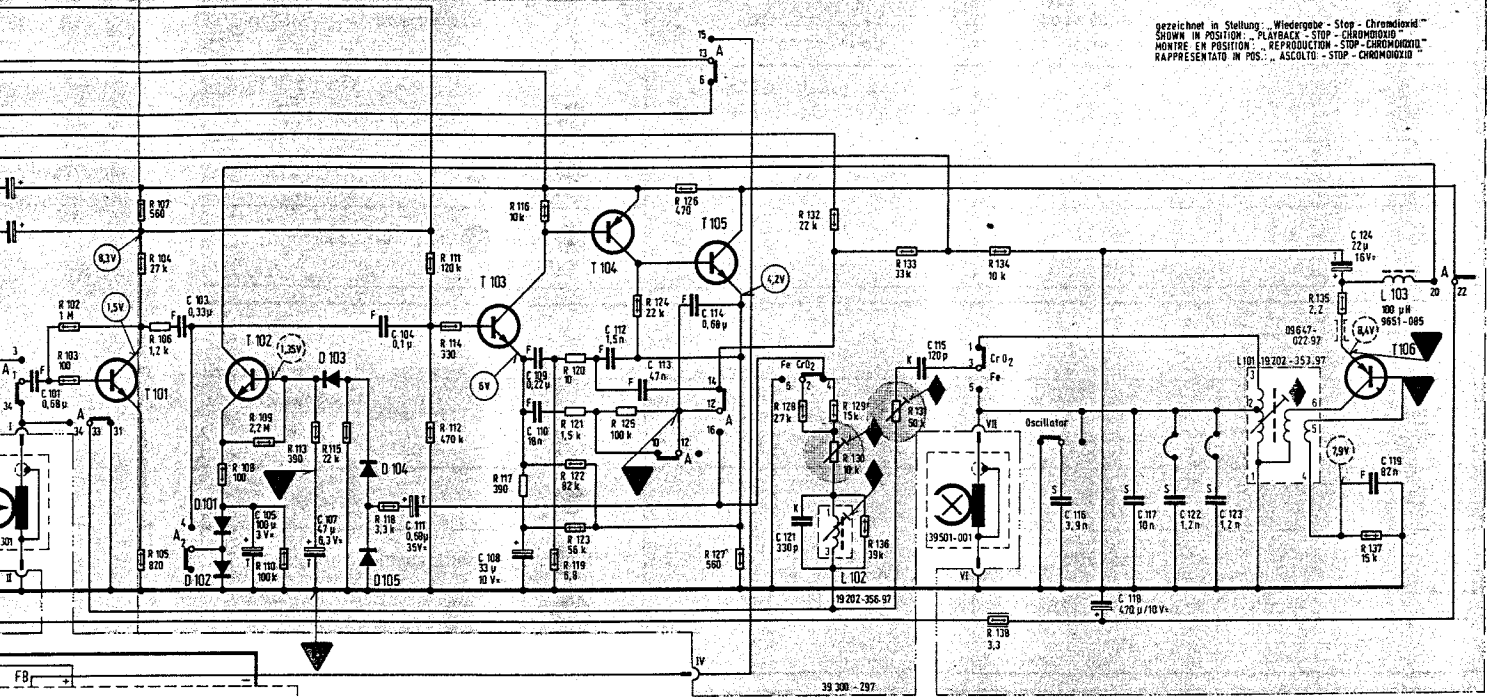


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314
309
238
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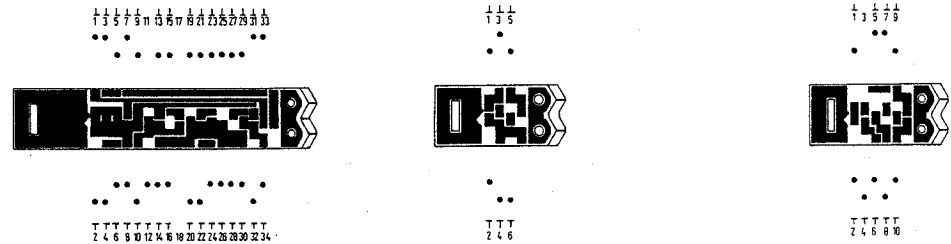


gezeichnet in Stellung: Wiedergabe - Stop - Chromdioxid
 SHOWN IN POSITION: PLAYBACK - STOP - CHROMDIOXID
 MONTRE EN POSITION: REPRODUCTION - STOP - CHROMDIOXID
 RAPPRESENTATO IN POS.: ASCOLTO - STOP - CHROMDIOXID



Motor - Baustein
 MOTOR-UNIT
 BLOC MOTEUR
 GRUPPO MOTORE

Siehe Schaltplan
 SEE SCHEMATIC
 VEDI SCHEMA



Printsgitze
 PRINT TAG
 CONTACT P.S. FICHE
 PUNTA SALDATOIA

Kontaktstelle
 CONTACT POINT
 POINT DE CONTACT
 PUNTO DI CONTATTO

Betriebsart FUNCTION POSIZIONE DI FUNZIONAMENTO	S1
Rücklauf FAST REWIND REBOBINAGE AVVOLGIMENTO VELOCE DA DESTRA A SINISTRA	●
Vorlauf FAST WIND AVANCE RAPIDE AVVOLGIMENTO VELOCE DA SINISTRA A DESTRA	●
Aufnahme RECORDING ENREGISTREMENT REGISTRAZIONE	●
Start START MARCHÉ	●

● Kontakt geschlossen
 CONTACT CLOSED
 CONTATTO CHIUSO

Schiebeschalter gez. in Stellung: Wiedergabe
 SLIDER SWITCH SHOWN IN POSITION: PLAYBACK
 COMMANDEUR GLISSANT MONTRE EN POS. REPRODUCTION
 COMUTATORE A CURSORE RAPPRESENTATO IN POS. ASCOLTO

Aufnahme
RECORDING
ENREGISTREMENT
REGISTRAZIONE

Wiedergabe
PLAYBACK
REPRODUCTION
ASCOLTO

Schiebeschalter gez. in Stellung: Chromdioxid
 SLIDER SWITCH SHOWN IN POSITION: CHROMDIOXID
 COMMANDEUR GLISSANT MONTRE EN POS. CHROMDIOXID
 COMUTATORE A CURSORE RAPPRESENTATO IN POS. CHROMDIOXID

Eisen
IRON
FER
FERRO

Chromdioxid
CHROMDIOXID

Schiebeschalter gez. in Stellung: Start
 SLIDER SWITCH SHOWN IN POSITION: START
 COMMANDEUR GLISSANT MONTRE EN POS. MARCHÉ
 COMUTATORE A CURSORE RAPPRESENTATO IN POS. START

STOP
ARRÊT

START
MARCHÉ

- Auslötwiderstand
- DIN 0207
- 1/8 W
- nicht entflammbarer Widerstand
NON INFLAMMABLE RESISTOR
RESISTENZA NON INFLAMMABILE
- Masse
- Masse

- F: Folien-Kond.
- K: Keramik-Kond.
- S: Styrolflex-Kond.
- S: Glimmer-Kond.
- Elko
- Tantal-Elko



C 4100
 (34014-906.00)

C 4500
 (34015-906.00)

102, 106, 101.	103.	105.	107.	104, 111.	108, 109, 101.	112, 113.	114.	121.	115.	116, 118.	117.	122, 123.	124.	119.
102, 103.	104, 105, 104.	108.	109, 110.	113, 115.	118.	111, 112, 114.	117, 116, 119, 120, 121, 122, 123, 125, 124.	127.	128, 129, 130, 132, 136, 131, 133.	134, 138.			135.	137.

210475 Ni

21825

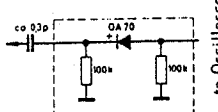
Unless otherwise stated the following information applies to a battery voltage of 9 V. If transistors in the IF stage are replaced, adjust R505 for 1.4 V at emitter of T06 before alignment.

FM-IF Alignment 10.7MHz

Switch receiver to UKW (VHF/FM). Short circuit the AFC by fitting a link at (Y) (see circuit diagram).

1. Discriminator alignment and AM suppression.
Connect wobbulator to the base of T06 and the oscilloscope to R516/517.
2. IF circuit alignment.

With approximately 20 mV on the base of T06 (maximum sweep) align the secondary circuit of ZF VIII so that the 10.7MHz point is in the middle of the linear section of the waveform. Keeping the input voltage constant, reduce sweep and adjust the primary circuit of ZF VII for maximum (peak) of the indicated waveform.

Alignment sequence	Wobbulator connected to	Oscilloscope connected to	Alignment
ZF VI	Base T05		● for maximum & symmetry
ZF V and ZF IV	Base T04		● and ● for maximum and symmetry
ZF III and ZF I	Aerial input connections		● and ● for maximum and symmetry

AM - IF Alignment 460kHz

Switch receiver to MW

Alignment sequence	Wobbulator connected to	Oscilloscope connected to	Alignment
ZF X1	Base T06	via test probe loosely to collector T06	● for maximum & symmetry
ZF X	Base T05		● for maximum & symmetry
ZF IX and ZF II	Base T03		● and ● for maximum & symmetry

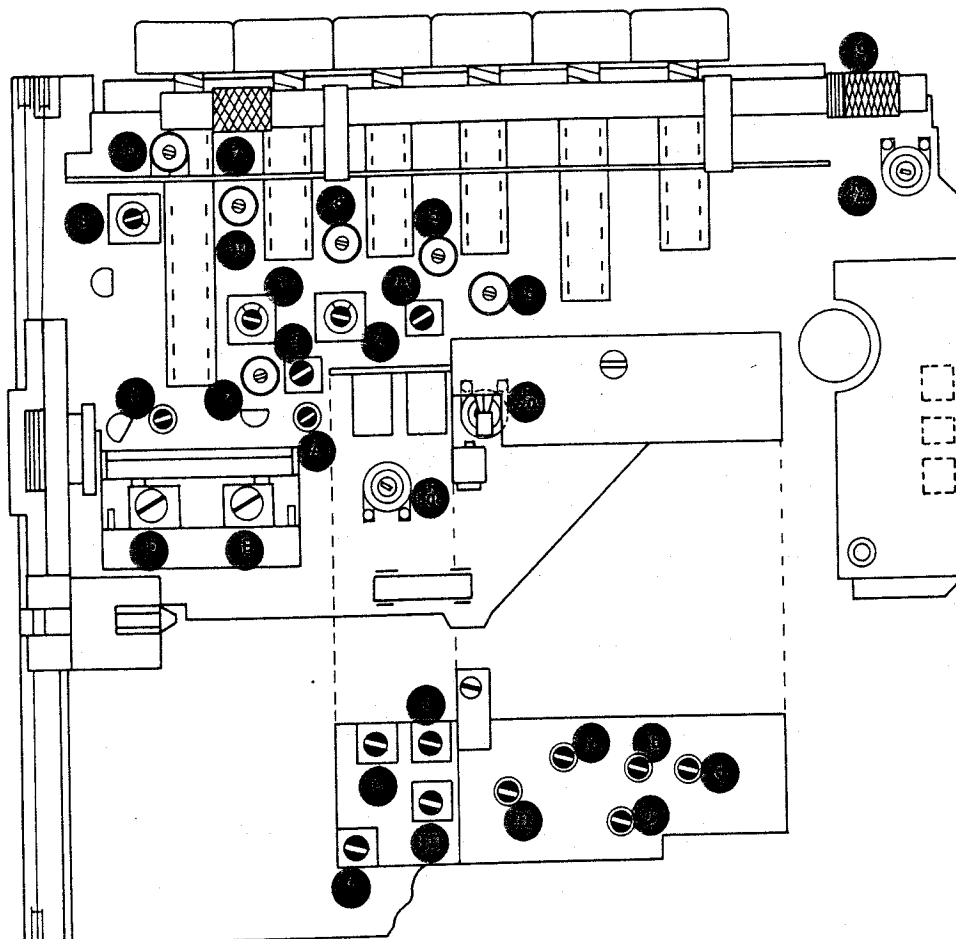
FM - Oscillator and Intermediate Circuit Alignment

Generator, Frequency, Pointer Setting	Oscillator	Intermediate Circuit	Noise	Oscillator Voltage at Emitter (measuring point)	Remarks
88MHz	● Max	● Max	7.5 kTo	60...40mV	Connect the signal generator (Ri=60Ω) directly to the connecting points of the telescopic aerial. The oscillator voltage after alignment must not exceed 6mV at the aerial socket loaded with 60Ω.
106MHz	● Max	● Max			

AM Oscillator and Aerial - Alignment

Range, Frequency, Pointer Setting		Oscillator	Aerial Circuit	Oscillator Voltage (at contact M8 or emitter T03)	For Service Manuals Contact MAURITRON TECHNICAL SERVICES 8 Cherry Tree Rd, Chinnor Oxon OX9 4QY Tel: 01844-351694 Fax: 01844-352554 Email: enquiries@mauratron.co.uk
KW	6.5MHz	● Max	● Max	70 ... 100mV	For KW (SW) alignment feed signal via 15pF direct to the telescopic aerial connections. Feed signal via dummy aerial connected to Ferrite rod. For alignment of the MW and LW bands the following sequence must be strictly followed. (MW-Oscillator, LW - aerial circuit and MW- aerial socket).
	15MHz	● Max	● Max		
MW	560kHz	● Max	● Max	100 ... 110mV	
	1450kHz	● Max	● Max		
LW	160kHz	● Max	● Max	95 ... 115mV	
	250kHz		● Max		

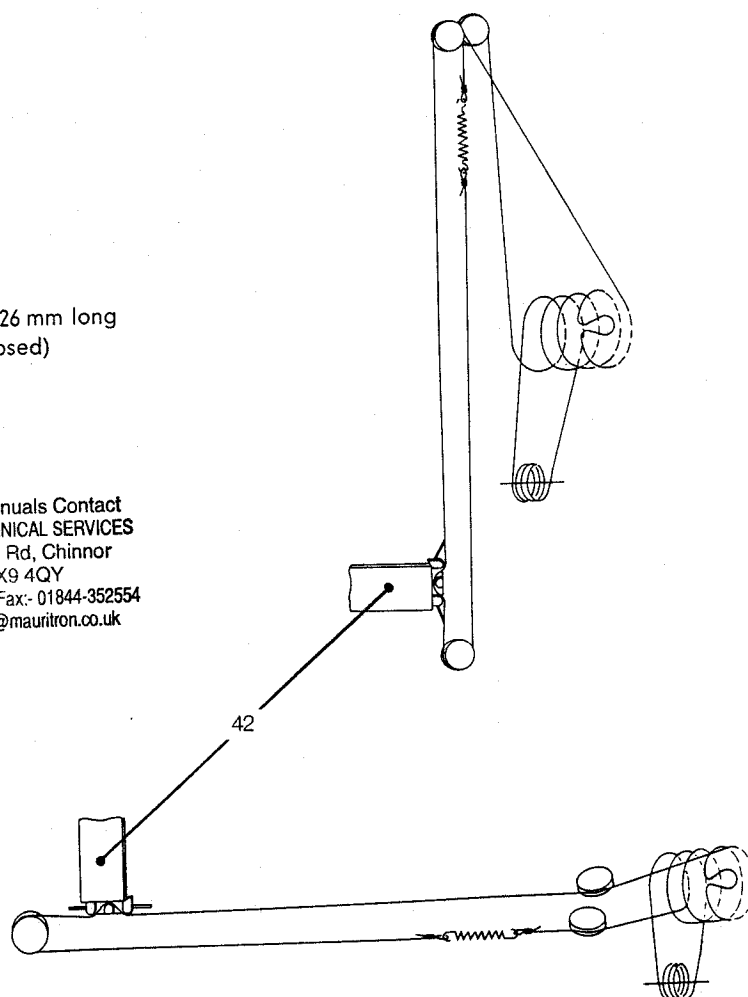
All oscillators must operate even when the battery potential = 4.5 V.



DRIVE CORD C 4500

Textile cord approx. 926 mm long
(variable capacitor closed)

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DRIVE CORD C 4100

Textile cord approx. 833 mm long
(variable capacitor closed)